We claim:

1. A method of communicating information over a power line transmitting power at a power line frequency, the method comprising:

creating a modulated signal representative of the information and having a carrier frequency which is derived from the power line frequency and a bandwidth of less than ten Hertz and wherein the modulated signal is created using a single modulation operation; and

coupling the modulated signal onto the power line.

2. The method of claim 1 wherein the modulated signal is a frequency shift key signal.

3. The method of claim 1 wherein the input is converted into space and mark frequencies.

4. The method of claim 1 wherein the carrier frequency is a multiple of the power line frequency.

5. The method of claim 1 wherein the carrier frequency is a non-integer multiple of the power line frequency selected to fall between the harmonics of the power line frequency.

6. The method of claim 1 wherein coupling the modulated signal onto the power line applies a voltage signal.

7. The method of claim 1 wherein coupling the modulated signal onto the power line applies a voltage signal using a resonant circuit.

8. The method of claim 1 wherein the carrier frequency is about approximately 1 to 7 kHz.

9. The method of claim 1 wherein coupling the modulated signal onto the power line applies a current signal using a current source output.

10. The method of claim 5 wherein the carrier frequency is about approximately 2 KHz.

11. The method of claim 2 wherein the information is arranged in packets of data bytes by a data shifter and packet generator which is clocked by a bit clock driven by a reference signal derived from the power line frequency.

12. The method of claim 2 wherein the packets use the HDLC synchronous protocol.

13. A method of transmitting a signal on a power line at transmission frequencies numerically derived from the power line frequency, comprising:

selecting a transmission frequency for the signal;

setting a voltage controlled oscillator to a preset frequency determined by the transmission frequency;

dividing the oscillator output by the transmission frequency to derive an internal reference signal;

comparing the phase of the internal reference signal to the phase of the power line carrier and using the changes in phase angle as a feedback signal in a frequency lock loop for maintaining the oscillator at the transmission

frequency; and

transmitting a signal on the power line using an output stage driven at the transmission frequency.

14. The method of claim 13 wherein the signal is a frequency shift key signal comprised of a sequence of space frequency and mark frequency pulses.

15. A method of transmitting a modulated data signal on a power line at frequencies numerically derived from the power line frequency, comprising:

selecting a mark frequency and a space frequency for the "1"s and "0"s of the data represented by the signal;

starting a voltage controlled oscillator at a preset frequency determined by whether the mark frequency or the space frequency is being transmitted;

dividing the oscillator output by either the mark frequency or the space frequency, depending upon which is being transmitted, to provide an internal reference signal;

comparing the phase of the internal reference signal to the phase of the power line carrier and providing the changes in phase as a feedback signal in a frequency lock feedback loop to control the frequency of the oscillator

16. A transmitter for sending data on a power distribution line having a power line frequency, comprising:

a bit clock;

a data shifter and packet generator for receiving data for transmission and

converting it into packets containing a plurality of data bytes transmitted in response to the output of a bit clock;

an A/D converter coupled to receive a signal from the power line at the power line frequency, the A/D converter coupled for delivering an output signal;

a power line frequency tracker circuit coupled to receive an output signal from the A/D converter and packets from the data shifter and packet generator, the tracker circuit comprising an oscillator circuit constructed and arranged for operating at a mark frequency derived from the power line carrier for "1"s and at a space frequency derived from the power line carrier for "0"s, the oscillator circuit operating as a phase lock loop circuit comparing the phase difference between a reference signal generated in the tracker circuit and the power line frequency and generating an output signal containing mark and space frequency components, the tracker circuit also delivering an internal time reference for the bit clock; and

a transmitter for coupling the output of the oscillator to the power line for transmission of the mark and space frequency signals having a bandwidth less than ten Hertz on the power line.

17. The invention of claim 16 wherein the data shifter and packet generator encodes the data for transmission in packets according to a HDLC protocol with each packet preceded by at least six bits of "1"s followed by a "0" and each sequence of five or six "1"s have a extra "0" inserted.

18. The invention of claim 16 wherein the data transmitted is in non-return to zero

format.

19. The invention of claim 16 wherein the data transmitted is in NRZI format.

20. A power line distribution communications system for transmitting selected information on an electric power distribution line transmitting power at a selected power frequency, the power line distribution communications system comprising:

a. a transmitter coupled to the electric power distribution line comprising:

an information signal generator providing an information signal;

a first reference circuit for detecting a power frequency of an alternating current transmitted on the electric power distribution line; and

a modulator connected to the information signal generator for taking the information signal as an input for modulation of a carrier signal, the modulator being operably connected to the first reference circuit such that the carrier signal has a frequency derived from and numerically referenced to the detected power frequency and a bandwidth of less than ten Hertz; and

b. a receiver coupled to the electric power distribution line and comprising:

a second reference circuit for detecting the power frequency of the alternating current transmitted on the electric power distribution line and providing a reference signal indicative of the detected power frequency; and

means for demodulating the carrier signal from the output carrier signal.

21. A method of communicating data over a power line which transmits power at a power line frequency, the method comprising:

converting the data to a series of pulses;

converting the pulses into a frequency division multiplexed signal having a carrier frequency which is numerically derived from the power line frequency and a bandwidth of less than ten Hertz;

coupling the frequency division multiplexed signal on the power line.

22. The method of claim 21 wherein the input is converted into space and mark frequencies.

23. The method of claim 21 wherein the carrier frequency is selected to fall between the harmonics of the power line frequency.

24. The method of claim 21 wherein the transmitting of the signal onto the power line is done in voltage mode.

25. The method of claim 24 wherein the carrier frequency is about approximately 5 kHz.

26. The method of claim 21 wherein the transmitting of the signal onto the power line is in current mode.

27. The method of claim 26 wherein the carrier frequency is about approximately 2 KHz.

28. The method of claim 21 wherein the series of pulses are arranged in packets by a data shifter and packet generator which is clocked by a bit clock driven by a reference at the power line frequency.

29. The method of claim 21 wherein the packets are HDLC packets.

30. The method of claim 29 wherein the packets are coupled to a power line frequency tracker which is also coupled to the power line frequency, the power line frequency tracker comprising an oscillator constructed and arranged for generating an internal reference signal and comprising circuitry for calculating the changes in phase between the internal reference signal and the power line frequency for use as an error signal for driving the voltage controlled oscillator

31. A receiver coupled to a distribution line carrying power at a power line frequency and a bandwidth of less than ten Hertz for receiving data therefrom as a data signal coded in packets of bytes which are comprised of sequences of mark or a space frequency signals to which the receiver is tuned, the receiver comprising:

a power line frequency tracker coupled to receive an input signal representative of the power line frequency and generate output frequencies representative of the mark and space frequencies to which the receiver is tuned;

a mixer circuit for mixing the sine and cosine of the pulse and mark frequencies generated by the power line frequency tracker and the data signal and producing a vector representing the frequency difference between the mark frequency and the data signal;

a comparison circuit for comparing the vectors and creating a data stream signal; and

a decoder circuit receiving the data stream and producing an output representing the data.

32. A method of communication information over a power line transmitting power at a power line frequency, the method comprising:

creating a modulated signal representative of the information and having a carrier frequency which is derived from the power line with carrier frequencies between 600 Hz and 10KHz; and

coupling the modulated signal onto the power line.

33. The method of claim 32 wherein the modulated signal is created using a single modulation operation.